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84th Congress
1st Session

JOINT COMMITTEE PRINT

JOINT COMMITTEE ON ATOMIC ENERGY

REPORT

OF THE

RAW MATERIALS SUBCOMMITTEE

ON ITS

VISIT TO AUSTRALIA

FEBRUARY 9, 1955

Printed for the use of the Joint Committee on Atomic Energy

UNITED STATES
GOVERNMENT PRINTING OFFICE
58420 WASHINGTON : 1955

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REPORT OF THE RAW MATERIALS SUBCOMMITTEE ON ITS VISIT TO AUSTRALIA

The Raw Materials Subcommittee of the Joint Committee on Atomic Energy accepted an invitation received during the fall of 1954 from the Government of the Commonwealth of Australia to visit their uranium mines and refineries and discuss with them the progress being made in the field of atomic development in Australia, particularly as it relates to the activities of the United States in this same field. Since this required a long journey, the subcommittee sought to combine with its Australian visit discussions and inspections of atomic activities involved in peaceful atomic development in a substantial number of southeast Asian and middle eastern countries.

In the 5 weeks between November 15 and December 20, the subcommittee visited and held conferences with Government, scientific, and industrial leaders in the following countries:

New Zealand	India
The Commonwealth of Australia	Pakistan
The State of South Australia	Iran
The Philippines	Turkey
Formosa	Greece
Thailand	Spain

The majority of the subcommittee's time involved discussions of peaceful atomic developments with a particular view to exploring at firsthand how bilateral agreements for cooperation, made possible under the provisions of the new Atomic Energy Act of 1954, might be achieved rapidly in the countries which we visited. Eight days of our trip were spent in Australia where our time was devoted about equally between uranium raw material and peaceful atomic developments.

A detailed discussion of our observations regarding the raw-materials situation in Australia and the prospects for peaceful uses of atomic energy in all the countries which we visited are set forth in this report.

Part I. General Observations

1. In Australia the committee found a flourishing and rapidly expanding uranium mining industry. At Radium Hill and Rum Jungle we found the most modern mining and milling plants actively producing large quantities of uranium concentrates for the free world. Geologic exploration and prospecting is active over large areas of the Northern Territory, Queensland, and South Australia, and numerous uranium finds are being made. We think it is important to note that in Australia, as in Canada, South Africa, the Belgian Congo,

and the United States, the prospecting is done and uranium is mined and refined under a private enterprise system, and that in those areas where the system is most free, development has been most rapid.

2. The response which we met everywhere to the announcement of the willingness of the United States to participate directly with foreign countries in the development of peaceful uses of atomic energy is far more overwhelming than we had heretofore appreciated.

3. Every country we visited has some competent scientific and engineering talent already at work in the atomic field, but all countries need direct assistance in evaluating how fast and how far they can go in this application of atomic energy, in setting up training programs within their own country to supplement existing personnel, and training programs in the United States for key personnel so that they may return to their countries and train others.

4. The plans and programs which were presented to us appeared uniformly realistic. Nowhere did we encounter government officials or scientists who underestimated the size of the job involved in peaceful applications and the period of time over which these can be achieved. Despite the widespread belief throughout the countries we visited that atomic power applications will come on a wide scale earlier than is practical in most cases, the government and scientific leadership in these countries has correctly evaluated the prospects.

5. It is our conclusion that all United States cooperation in the field of peaceful atomic application must be coordinated within some formal structure. As hopeful as are the prospects for an international atomic development agency, it is our observation that bilateral agreements for cooperation tailored to meet the needs of the individual countries can and must be entered into promptly so that peacetime atomic development may get under way on a broad scale, despite any delays which may be encountered in the establishment of the international agency.

6. We were impressed in every country by the fact that the details of the opportunities for atomic contributions to the local economies are inadequately understood by United States representatives abroad. As a result, we recommend that the full committee take whatever steps it can to urge the Executive to establish a program which would include as a minimum creating small teams of diversified talent which could be sent on request to countries such as those we visited for the purpose of assisting in an evaluation of the ways and means by which peaceful atomic applications could be realized. Out of such evaluations there should arise agreements for cooperation based on firsthand knowledge of the needs and capabilities of each country.

7. In the interim, prior to precise evaluation and formulation of the programs in these countries, and others like them, a general minimum agreement for cooperation might profitably be drawn up by the Executive as a basis for initial atomic relationships with such friendly countries. The subcommittee is of the opinion that official United States assistance should flow within the framework of such agreements for cooperation and that these minimum-term agreements should be entered into promptly with as many friendly countries as is possible. The subcommittee observed repeatedly that if the United States fails to come forward with some concrete and formal way of demonstrating its willingness to get on with atomic cooperation immediately with these countries, some substantial portion of the

good will inherent in the provisions of the Atomic Energy Act of 1954 which envisages such cooperation will be lost.

8. And, finally, the subcommittee would like to point out that in most cases United States atomic aid to countries such as those which we visited need not involve large financial assistance during the early period of cooperation. . In fact, we observed in many places that basic laboratory equipment, such as Geiger counters and scalers, costing only a few thousand dollars, would make it possible for the small groups of competent scientists already in these countries to begin making substantial contributions to their own countries as well as to science generally. This is especially true in the fields of uranium exploration, agricultural experimental work, medical activity—including clinical work, biology, and basic research.

An outstanding example of the assistance which the United States can render at little or no cost was encountered in India. There the Government has plans for the construction of a large research reactor which will use heavy water as a moderator. The Indian Government is already beginning construction of a heavy water production plant which it has every reason to expect will be able to furnish the quantity necessary by the time this first large research reactor is ready to start operating. What the Indians need is an assurance from the United States that, in the unlikely event that their own heavy water production plant falls behind schedule, they can rely on a loan of heavy water from the United States to get their reactor in operation promptly. In the first place, the Indian production schedule appeared to us to be realistic; in the second place, even if the United States should have to loan this material to India, it would certainly be for a reasonable time. The total cost of our assurance to India would be no more than the theoretical interest on the heavy water inventory which might be tied up for a few months in their reactor. Such an assurance from us would constitute the kind of genuine cooperation from the United States that is needed to prove our good intentions.

The members of the subcommittee deeply appreciate the opportunity afforded them in making this trip to discuss these matters with responsible individuals in the various local settings and found it of immeasurable value. We know of no substitute which could give the kind of understanding we believe we have acquired. We believe that an opportunity has been created to speed up bilateral agreements for cooperation with the nations which we visited, and that this opportunity alone is sufficient recompense for the arduousness of the trip which we undertook.

Part II. Raw Materials

The original basis for planning the committee's trip to Australia was an invitation from the Commonwealth of Australia to visit the uranium mines and the uranium processing plants which had recently been constructed in the Northern Territory and in the State of South Australia.

Sidney.—In Sidney, Australia, discussions were held with Gen. J. E. S. Stevens, Chairman of the Australian Atomic Energy Commission, and members of his staff. These discussions covered both the raw materials picture and the atomic energy research picture. That same evening the committee held discussions with Hon. O. H.

Beale, Q. C., Commonwealth Minister of Supply, to whom the Atomic Energy Commission of Australia reports.

Canberra.—The next day the committee visited Canberra. Further discussions were held with Mr. Beale, Senator W. H. Spooner, Minister for National Development; Dr. H. G. Raggatt, Secretary of the Ministry for National Development, who is one of the world's outstanding geologists; and the members of the Australian Atomic Energy Commission, concerning uranium developments in the Commonwealth of Australia, with particular reference to the activities in the Northern Territory where the famous Rum Jungle deposits are located.

Melbourne.—In Melbourne, the committee talked with Mr. P. B. Nye, Director of the Commonwealth Bureau of Mineral Resources, and his staff. These discussions related to the general geology of Australia, and the areas of Australia considered favorable for uranium occurrence from a geologic standpoint and a résumé of recent uranium discoveries in the Northern Territory and in the State of Queensland. The committee was much impressed with the large number of uranium occurrences which have recently been found near Rum Jungle in a new area about 200 miles north and east of Rum Jungle and in the Mount Isa area in the State of Queensland. The Commonwealth Bureau of Mineral Resources is vigorously pursuing a geologic program designed to aid the uranium prospector. We were impressed with the similarity between its operations and those of the United States Geological Survey in the Colorado Plateau area.

Adelaide.—In Adelaide the party had the pleasure of being escorted on its visit to the uranium properties and production plants by Hon. T. Playford, Premier of the State of South Australia, assisted by Sir A. Lyell McEwin, Minister of Mines for the State of South Australia, and Mr. S. B. Dickinson, Director of Mines for the State of South Australia.

The State of South Australia operates the Radium Hill mine and mill, a uranium refinery at Port Pirie, and a large ore dressing laboratory and pilot plant in Adelaide.

The committee visited the pilot plant and laboratories during its first day in Adelaide. These two facilities compare favorably with similar laboratories in the United States and have done an excellent job in developing and pilot planting the uranium refining processes used at Radium Hill and Port Pirie and the new processes which were recently installed at Rum Jungle. The excellence of this laboratory and pilot plant is attested to by the fact that the Commonwealth Government of Australia contracted for the Rum Jungle pilot plant work with the South Australian government and several of the large mining companies in Australia are currently having uranium work done for them at this laboratory. We were pleased to note that that laboratory has close working arrangements with the United States Atomic Energy Commission.

The second day in South Australia, the committee journeyed to the Radium Hill mine which is located about 150 miles north and east of Adelaide. The committee went underground in the Radium Hill mine and also visited the mill and the townsite. The entire Radium Hill project is a model of modern mining practice and compares favorably with the best mining camps in the world.

Broken Hill.—The committee stayed overnight at Broken Hill, in New South Wales, just over the line from South Australia. Broken Hill is one of the world's great zinc-lead deposits.

This overnight stop gave the committee the chance to talk with executives of the Zinc Corp., Ltd., which recently set up a subsidiary to operate the Rum Jungle properties under contract with the Commonwealth of Australia. The personnel to staff this new subsidiary, known as Territory Enterprises, was drawn in good measure from the Broken Hill operations. The committee was most favorably impressed with the managerial ability of the Zinc Corp. staff in Broken Hill.

Port Pirie.—The committee next visited the Port Pirie refinery which is nearing completion and should go into operation in the spring of 1955. This plant will refine the uranium concentrates produced by the mill at Radium Hill and make a high-grade product suitable for shipment to the United States. This refinery, like the Radium Hill plant, is owned and operated by the government of the State of South Australia.

Rum Jungle.—Following the committee visit to the South Australian Uranium Properties, we flew directly across Australia to the capital of the Northern Territories, Darwin, where the committee met with the Administrator of the Northern Territories, Hon. F. J. S. Wise. The next day the committee drove with Mr. Wise 60 miles south of Darwin on a fine paved highway to the Rum Jungle mine, mill, and townsite. The Rum Jungle property has a small exploration shaft, but actual mining will be done through an open pit. We visited the open pit where excavation of the overburden is well under way. This work was being carried out with the most modern American excavation equipment under a subcontract with a large English construction contractor. The party also visited the Dyson mine which is just a few miles from the Rum Jungle mine, known locally as White's mine.

The new mill at Rum Jungle had just recently gone into operation and the committee was pleased to see that it was running smoothly and efficiently and fully living up to its design criteria. We also visited the brand new townsite for the Rum Jungle properties known as Batchelor and were very favorably impressed with the modern housing and up-to-date shopping center in what had been a wilderness 5 years ago.

The committee came away with the strong conviction that the money which the United States had advanced on loans to the Government of the Commonwealth and of South Australia had been prudently and efficiently expended and that Australia now has two large producing uranium properties which are daily adding to our uranium supply. The high degree of activity in uranium prospecting and the number of uranium strikes in the past 2 years gave every indication that Australia will become one of the world's great sources of uranium in the next decade.

Part III. Peaceful Uses of Atomic Energy

New Zealand, as part of the British Commonwealth of nations, is already beginning to play an important part in the integrated atomic-energy program organized from London. One type of atomic power-plant which promises commercial power at an early date will require heavy water, a material which we are using in the new production reactors at Savannah River.

In New Zealand there is what the scientists call a geothermal zone which runs diagonally across North Island. These extensive hot springs can provide a cheap source of the heat necessary to produce heavy water in commercial quantities as well as low-cost electricity. Development of this natural resource is under way. We spent a day high in the mountains of New Zealand inspecting the experimental work going on there and talked at length with their works manager.

We also talked informally with members of an advisory team who had been sent to New Zealand from the Harwell Laboratories in England and learned certain things of interest about the British program which have not been available to us through other channels. It should be pointed out that no information was discussed which the United States holds classified, but the collective working knowledge of the party made many things which were said by those with whom we talked throughout the trip meaningful—far more meaningful than those same statements can be expected to be to United States diplomatic representatives abroad.

In addition to inspecting the geothermal area in New Zealand, we talked to Government and scientific representatives in Wellington with particular regard to their electric power needs in the future and their agricultural and medical research programs. We found that radioisotopes are already being used in New Zealand to improve grasses and dairy products.

We were particularly intrigued with a radioisotope experiment performed in New Zealand a few years ago. In a research project employing radioactive cobalt it was found that much of the soil of New Zealand was deficient in cobalt. This cobalt deficiency adversely affected the growth of grass and seriously reduced the nutritional value of the pasture grasses. As a result of this discovery the New Zealand farmers undertook to spray their pastures with cobalt. This spraying was done from airplanes. The New Zealand grass is now among the finest in the world. The committee observed eloquent evidence of this fact in the millions of sheep and cattle we saw grazing on every side as we drove through North Island. Here is one dividend from the peaceful atom which has meant much to the New Zealand economy and has awaked the interest of every New Zealander in atomic energy.

There are many similar developments in the field of agriculture in the United States which offer great potential benefits to the New Zealand economy. If an agreement for cooperation authorized in our new Atomic Energy Act could be entered into promptly it would benefit both of us. It is clear that New Zealand is so far from the existing sources of radioisotopes in the United States and England that an effective experimental peacetime atomic program will require the construction of a research reactor capable of producing isotopes somewhere in that part of the world.

New Zealand does not face an electric power shortage within the next 20 years, for she has adequate hydro and geothermal energy sources to take care of her growing industrial economy up to 1975. However, New Zealand does not have an adequate supply of fossil fuels and in the period beyond 1975 her demand will exceed the potential capacity of these hydro and geothermal resources. Beginning in the seventies, New Zealand will have to depend on atomic energy to meet her additional electric power needs. New Zealanders are therefore anxious to learn about atomic power and follow its development

in the United States and throughout the world so that they may be in a position to build and operate their own atomic powerplants cheaply and efficiently.

We had the good fortune of meeting and talking with Dr. Watson-Munro in Wellington. Dr. Watson-Munro is New Zealand's leading physicist. He was about to go to Australia to head the scientific atomic effort in that country. We were therefore able to get a projection of his thinking with regard to the Australian program.

AUSTRALIA

In Australia, there is vigorous public, political, scientific, and industrial interest in all phases of atomic development. The Commonwealth Government has plans for the construction of a major research reactor within the next 3 years. Our group met with the Australian Atomic Energy Commission in Sydney and talked at length with both the administrative and scientific members of the organization. Their Atomic Energy Commission, headed by General Stevens, is a small, compact and purposeful organization. Their first major atomic laboratory is nearing completion. Increased atomic activities are finding support not only in the capitol at Canberra but among industrialists throughout the country.

There are both Government and private plans for the construction of large research reactors in the Commonwealth of Australia. It appears likely that the first of these will be under construction within the next 2 years. From these machines the Australians hope to learn more about reactors generally and get on with designing and building their first atomic powerplant. Because the United States has been unable, due to statutory restrictions in the Atomic Energy Act of 1946, to give active assistance on reactor development to the Australians, most of the assistance so far has come from England. Now that the Atomic Energy Act of 1954 is in effect and not only permits, but encourages, the cooperation of the United States in this field, the Australian commission is looking forward to similarly close cooperation with the United States. We believe the Joint Committee would find it a pleasure to join other American groups in being host to representatives from the Australian commission later this year. There is every reason to believe that an initial agreement for cooperation with Australia can be entered into promptly and profitably, so that when such representatives arrive in our country there will be a legal framework to implement our cooperation with them.

We also met with Prime Minister Menzies and his Cabinet at Canberra, and with the Minister of Supply, the Honorable O. H. Beale, on several occasions. There is every reason to expect that atomic energy can make great contributions to the Australian economy in the fields of agriculture, medicine, and electric power. This is a nation of 9 million people living in a land larger than the United States. They are ambitious and have a high standard of living, but they are beset with the economic problems of a rapidly expanding economy. They deeply appreciate the fact that the United States is their strongest partner in the Pacific and that they must rely on United States leadership and aid to protect them against the advances of communism in the Orient. The Australians showed themselves to be a resourceful people with an understanding of what can be

achieved by self-help and hard driving organization. Despite the close ties which exist between Australia and Great Britain, we sensed everywhere that Australia looks to the United States as a close and warm ally.

We spent 3 days in South Australia conferring with Premier Playford and the members of his government and their various industrial organizations. It is important to bear in mind that Australia is a Federal union and that they have a degree of autonomy far exceeding that to which we are accustomed. It is truly a Confederation of States though this in no way diminishes the prestige of the Commonwealth Government. It is important to bear this in mind when dealing with the Commonwealth of Australia and with the individual States. South Australia contains a substantial portion of the uranium resources of Australia and is a proud and separate entity with a rapidly growing industrial complex. We were deeply impressed with the efficiency and substantial character of the entire atomic energy program in South Australia.

South Australia needs atomic power. The State is now planning to supplement the conventional electric resources available to its Electricity Trust with atomic energy in the early 1960's and is looking to the United States for extensive technical guidance in achieving this goal.

We had an opportunity to inspect the laboratories which have been built outside of Adelaide by the South Australian government and members of the party met with the Electricity Trust for a detailed discussion. Plans are now going forward to equip existing powerplants to burn either coal or oil, in order to make maximum use of the recent oil discoveries on the west coast of Australia. Another project is going forward to make use of the brown coal deposits which exist in South Australia. But these resources are not sufficient to meet the long-term needs of the rapidly expanding industrial complex in this State. Therefore, the Electricity Trust is planning on supplementing its electricity resources with atomic power beginning in 1963. This is a realistic plan which will require hard work on the part of the South Australians and considerable technical assistance and guidance on the part of Great Britain and the United States. We were impressed by the fact that the South Australians have managed to work out the plan for meeting their electric power needs in such a way as to bring atomic power into their picture at approximately the same time as we have been informed here in the United States it is reasonable to begin to place reliance on this resource.

As a first step the South Australian government plans to build a research reactor of modified United States design at the University of Adelaide. They hope to have this machine running sometime in 1958 or 1959 and are prepared to finance it themselves. Of course, they will require outside technical assistance. Their total program appeared to us to be most well-conceived. These people are staunch allies of ours in a critical part of the world and are earning our equally warm support.

From South Australia we traveled north across the great Australian desert, stopping on the way for a brief visit at the joint Australian-British guided missile test range known as Woomera. It was on this range not many months ago that the British conducted their second series of atomic weapons tests.

On the northern coast of Australia we stopped and went back into the hinterland to inspect the famous uranium mining area known as Rum Jungle.

THE PHILIPPINES

From Australia our subcommittee went north to the Philippines. We met with President Magsaysay at Manila and talked with him and his staff about the prospects of peacetime applications for atomic energy. We were all impressed with the fundamental grasp which the top Government leaders of the Philippines have on what atomic energy can do for their country and the modest and realistic attitude which they take for its achievement. The general standard of living in the Philippines today is far too low and the amount of industrialization which has been possible thus far is insufficient for a modern nation. Atomic energy can do much to improve both of these areas. There are many young Filipinos trained in American universities who are familiar with varying aspects of atomic energy. There is basic research going on now at the great university in Manila.

The Filipinos have an excellent agricultural college and several fine agricultural experiment stations. Dr. Paul B. Pearson, of the Biology and Medicine Branch of the Atomic Energy Commission, who closely follows the agricultural program of the Commission, visited the Philippines and toured their agricultural stations just a week after the committee's visit. We met with Dr. Pearson after his visit and found ourselves in agreement with him as to the challenge offered by their interest and competence. Here obviously is a case where the early signing of an agreement to cooperate would make it possible to put the peaceful atom promptly and effectively to work.

Our Filipino friends are ready to cooperate with us both to the end of improving their agricultural and industrial lot and to the advancement of a science still too little understood. They would make valuable allies in our common war against the scientific unknown.

FORMOSA

Formosa was our next stop. On Formosa our subcommittee met with representatives of both the American missions there and the Governments of Free China and of Formosa. We explored ways in which radioisotopes could be used to improve the agricultural production on Formosa and to raise the standards of health there. This island economy could profit from such experimental atomic work.

THAILAND

One of our most thrilling experiences occurred during our visit to our friendly and warm allies in Thailand. Until the word went out several months ago of our plan to visit Bangkok, there was no organized Government activity in the field of atomic energy in Thailand. This is not to say that there were not a number of interested and competent individuals at work individually and in small groups, but they lacked any cohesive plan and any specifically directed Government support. We found upon our arrival that a new atomic energy committee had been formed, headed by the Deputy Prime Minister. The third meeting of their committee was with our subcommittee.

It was an impressive meeting—impressive because of the realism and directness of their statements. The people of Thailand can be benefited, especially in the fields of medicine and agriculture, through the use of radioisotopes, and they might profitably use a small research reactor. We understand that they will shortly make proposals to our State Department for an agreement for cooperation. The United States would do well to seize upon this opportunity quickly and demonstrate to the people of Asia that the peacetime benefits of atomic energy which the United States stands ready to offer are real and in many instances can be of almost immediate benefit to their economy.

INDIA

India has a large and rapidly expanding atomic energy program. Its nature is not well understood outside India, and we ourselves found that we had arrived with some misconceptions. Particularly in the fields of physics, chemistry, and biology the Indians are making outstanding contributions. This is no backward nation when it comes to modern science. Indians of all ages in their laboratories are earning their rightful place in the scientific and engineering fraternity. We visited first in Calcutta and then in New Delhi to talk with some of the people, both Government and scientific, about what they are doing and what they hope to do.

Calcutta.—Our visit in Calcutta, though brief, we felt was an important one. It gave us an opportunity to talk at firsthand to people who are actively working in the field of atomic energy. It was our pleasure to meet again with Dr. Saha, of the University of Calcutta, with whom the full Joint Committee had the pleasure of meeting here in the Capitol last year.

We found particularly interesting the serious commentaries we obtained in India on the hollowness of the offers which have been made by the Soviet Union to assist this part of the world. We were given well founded testimony on the complete unwillingness of the Soviet Union to bring any real benefits and contribute any real scientific and engineering knowledge to the end that the people of India may enjoy the benefits of atomic energy.

New Delhi.—In New Delhi we had the pleasure of meeting with many representatives of the Indian Government, though unfortunately Prime Minister Nehru was not in the city. We met with the Indian Atomic Energy Commission and learned much more about their program than had been available to us previously. We came away with the distinct impression that the Indian atomic effort is an important one not only to India but to the advancement of science. Concrete plans are actually going forward and some construction is underway looking toward the first of two large research reactors, both on modified, unclassified American design.

We visited the National Physical Laboratory, which is renowned for its development of the so-called solar cooker which uses the heat of the sun to cook food and heat homes. Here in this institute Dr. K. S. Krishnan, director of the laboratory, and a member of the Indian Atomic Energy Commission, took members of our party on a tour of one of the finest scientific laboratories we have ever visited. This institute is well equipped and well staffed to do work in basic science. Work is nearing completion on the construction of a large particle accelerator.

There are ways in which we can assist in the prosecution of this program at little or no dollar expense to the United States, yet in ways which would be deeply appreciated by the Indians, and would be of real assistance to them. It is our own hope that ways can be found in the near future, again through an agreement for cooperation, to extend this assistance.

PAKISTAN

In Karachi we had the very real pleasure of meeting first with Prime Minister Mohammed Ali, and later with the Council of Scientific and Industrial Research for Pakistan. Long and hard though the road ahead is for the people of Pakistan, they see and are attempting to grasp the opportunities to make their passage along that road both faster and better through the use of atomic energy. They have already established a central research laboratory in Karachi and will shortly open three regional laboratories.

We noted with interest upon our return to the United States an announcement of the intentions of those in the British atomic-energy program to assist in the development of these laboratories. Scientists and Government administrators alike made it clear to us while we were there conferring with them that they must have assistance and would welcome it particularly from the United States.

We flew north to Peshawar near the Khyber Pass in order that we might meet with the faculty of the university there, since it is on their campus that the first regional laboratory is to be established. In the barren foothills of the Himalayas we talked long and earnestly with men trained here at our own Oak Ridge and Argonne and at Princeton—men of scientific and technical stature who are trying already with their limited resources to bring their country the benefits of this most revolutionary science.

IRAN

In Teheran we met with Prime Minister Zahedi and his Minister of Foreign Affairs, as well as other members of the Iranian Government. The economic difficulties of Iran have been much eased by the recent settlement of the long oil dispute. The ways and means by which atomic energy can help raise the standards of living in Iran and improve health are not unlike those everywhere, but the problems of organizing such programs are not as far along as those in most countries which we visited. It is entirely possible that a small United States task force—3 or 4 men—for a few months might be able to give real assistance on this score. Again we wish to emphasize that we are not suggesting multi-million-dollar foreign-aid programs but the carefully selected, prudent expenditure of $5,000 or $10,000 here and there in the way that will do the most good and at the most propitious moment. Large sums of money too late are no substitute for timely assistance on a modest scale.

TURKEY

At Ankara we were all impressed by the large assembly of learned scientific ladies and gentlemen who were brought together to meet with us. We had no prior knowledge of the extent of the scientific

talent available in Turkey which can be devoted to bringing peacetime atomic benefits to that country. What we learned was most encouraging.

It was an unexpected pleasure to meet Professor Alisbah, professor of higher mathematics at the University of Ankara, who is also a member of the Institute for Advanced Studies at Princeton. He was only one of those whom we met in Turkey who are tangible evidence that here is a country which is able to make contributions in this field of science. We always have too few really competent minds tackling the problems of the scientific unknown. We personally found the Turkish plans for an atomic cancer institute of special interest and were impressed that these are more than just plans, that the first laboratory is already in operation. Our countries could benefit mutually from a program of closer cooperation in peacetime atomic pursuits.

GREECE

In Greece, as in Iran, we found the need for atomic agricultural and medical benefits to be very great indeed and the present means of bringing them to the people far too limited. The American taxpayer has spent large sums to aid the Greeks in repelling the Communist threat, and the Greeks have made wise use of this help. The country is today a vigorous member of the free world. However, it still faces grave economic problems. Food production is primitive by our standards. The country's power resources are quite limited. To the long-range goal of raising the Greek standard of living and achieving a stabilized economy, atomic energy—if wisely used—can contribute and even provide short cuts both in dollars and time. Here also our responsibility is great, out of humanitarian as well as ideological kinship.

SPAIN

Our meeting with the Spanish Nuclear Energy Commission in Madrid was a highlight of our trip. This aggressive group is carrying out its basic nuclear development program primarily through grants to existing institutions. For example, they have a large electronics and instrument development group at the University of Madrid, as well as a reactor development group there. They have concrete plans for building a reactor which they seriously hope can be of the swimming-pool type which has been successful here in the United States. They recognize their need for a larger number of trained people, particularly in the field of reactor engineering. General Vigon, President of the Commission, and Dr. Otero were especially anxious to learn how the new provisions of the Atomic Energy Act would permit them to enter into an agreement for cooperation with the United States. The Spanish experience in recent months with the United States technical-assistance program under our new treaty and agreements has convinced them that the kind of assistance they need in their nuclear program can best be obtained from the United States. They need direct technical assistance from Americans who have built and operated research reactors of the sort the Spanish Nuclear Energy Commission is planning to build. They need assistance in setting up a training program in Spain as well as an opportunity to send Spanish scientists and engineers to the United States for training.

They are interested in much more than just electric power. Spain has an agricultural extension service and good central medical facilities which could effectively use many of the things the United States has learned in these fields.

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